Report for ForestQuery into Global Deforestation, 1990 to 2016

ForestQuery is on a mission to combat deforestation around the world and to raise awareness about this topic and its impact on the environment. The data analysis team at ForestQuery has obtained data from the World Bank that includes forest area and total land area by country and year from 1990 to 2016, as well as a table of countries and the regions to which they belong.

The data analysis team has used SQL to bring these tables together and to query them in an effort to find areas of concern as well as areas that present an opportunity to learn from successes.

1. **GLOBAL SITUATION**

According to the World Bank, the total forest area of the world was ____ **41282694.9 sqkm**_____ in 1990. As of 2016, the most recent year for which data was available, that number had fallen to ____ **39958245.9 sqkm**_____, a loss of ____ **1324449**_____, or _____**3.21**_____%.

The forest area lost over this time period is slightly more than the entire land area of _____**Peru**_____ listed for the year 2016 (which is __ **1279999.9891** _____).

2. **REGIONAL OUTLOOK**

In 2016, the percent of the total land area of the world designated as forest was __ **31.38**_____. The region with the highest relative forestation was____ Latin **America & Caribbean** _____, with ____ **46.16** _____%, and the region with the lowest relative forestation was ____ **Middle East & North Africa** _____, with _____ **2.068** _____% forestation.

In 1990, the percent of the total land area of the world designated as forest was _____ **32.42** _____. The region with the highest relative forestation was___ **Latin America & Caribbean** _____, with _____ **51.029** _____%, and the region with the lowest relative forestation was __ **Middle East & North Africa** _____, with __ **1.775** _____% forestation.

Table 2.1: Percent Forest Area by Region, 1990 & 2016:

Region	1990 Forest Percentage	2016 Forest Percentage
North America	35.6511790009015	36.0393609681438
East Asia & Pacific	25.7760953973175	26.3586765000485
Latin America & Caribbean	51.0299798667514	46.1620721996047
Middle East & North Africa	1.77524062469353	2.06826486871501
South Asia	16.510767001421	17.5058634081534
Sub-Saharan Africa	30.6741454610006	28.7881883550464
Europe & Central Asia	37.2839398564019	38.0414216032517

The only regions of the world that decreased in percent forest area from 1990 to 2016 were __ **Latin America & Caribbean** _____ (dropped from ____**51.0299798667514**_____% to __**46.1620721996047**_____%) and ___ **Sub-Saharan Africa** _____ (_____**30.6741454610006**_____% to ___**28.7881883550464**_____%). All other regions actually increased in forest area over this time period. However, the drop in forest area in the two aforementioned regions was so large, the percent forest area of the world decreased over this time period from __**32.4222035575689**_____% to ____**31.3755709643095**_____%.

3. **COUNTRY-LEVEL DETAIL**

A. SUCCESS STORIES

There is one particularly bright spot in the data at the country level, _ **China** _____. This country actually increased in forest area from 1990 to 2016 by ___ **527229.062** _____. It would be interesting to study what has changed in this country over this time to drive this figure in the data higher. The country with the next largest increase in forest area from 1990 to 2016 was the__ **United States** _____, but it only saw an increase of ____ **79200** _____, much lower than the figure for ____ **China** _____.

__ **China** _____ and _____ **United States** _____ are of course very large countries in total land area, so when we look at the largest *percent* change in forest area

from 1990 to 2016, we aren't surprised to find a much smaller country listed at the top. ___**Iceland** _____ increased in forest area by __**213.664588870028** _____% from 1990 to 2016.

B. LARGEST CONCERNS

Which countries are seeing deforestation to the largest degree? We can answer this question in two ways. First, we can look at the absolute square kilometer decrease in forest area from 1990 to 2016. The following 3 countries had the largest decrease in forest area over the time period under consideration:

Table 3.1: Top 5 Amount Decrease in Forest Area by Country, 1990 & 2016:

Country	Region	Absolute Forest Area Change
Brazil	**Latin America & Caribbean**	**541510**
Indonesia	**East Asia & Pacific**	**282193.9844**
Myanmar	**East Asia & Pacific**	**107234.0039**
Nigeria	**Sub-Saharan Africa**	**106506.00098**
Tanzania	**Sub-Saharan Africa**	**102320**

The second way to consider which countries are of concern is to analyze the data by percent decrease.

Table 3.2: Top 5 Percent Decrease in Forest Area by Country, 1990 & 2016:

Country	Region	Pct Forest Area Change
Togo	**Sub-Saharan Africa**	**-75.4452559270073**
Nigeria	**Sub-Saharan Africa**	**-61.7999309388418**
Uganda	**Sub-Saharan Africa**	**-59.1286034729531**
Mauritania	**Sub-Saharan Africa**	**-46.7469879518072**
Honduras	**Latin America & Caribbean**	**-45.0344149459194**

When we consider countries that decreased in forest area percentage the most between 1990 and 2016, we find that four of the top 5 countries on the list are in the region of _____ **Sub-Saharan Africa** _____. The countries are __**Togo** _____, ____ **Nigeria** _____ _____, ____ **Uganda** _____, and ____ **Mauritania** _____. The 5th country on the list is __ **Honduras** _____, which is in the _ **Latin America & Caribbean** _____ region.

From the above analysis, we see that ____ **Nigeria** _____ is the only country that ranks in the top 5 both in terms of absolute square kilometer decrease in forest as well as percent decrease in forest area from 1990 to 2016. Therefore, this country has a significant opportunity ahead to stop the decline and hopefully spearhead remedial efforts.

C. QUARTILES

Table 3.3: Count of Countries Grouped by Forestation Percent Quartiles, 2016:

Quartile	Number of Countries
0%-25%	**85**
25%-50%	**73**
50%-75%	**38**
75%-100%	**9**

The largest number of countries in 2016 were found in the ___**0%-25%**_____ quartile.

There were _____**9**_____ countries in the top quartile in 2016. These are countries with a very high percentage of their land area designated as forest. The following is a list of countries and their respective forest land, denoted as a percentage.

Table 3.4: Top Quartile Countries, 2016:

Country	Region	Pct Designated as Forest
Suriname	**Latin America & Caribbean**	**98.26**
Micronesia, Fed. Sts.	**East Asia & Pacific**	**91.86**
Gabon	**Sub-Saharan Africa**	**90.04**

Seychelles	**Sub-Saharan Africa**	**88.41**
Palau	**East Asia & Pacific**	**87.61**
American Samoa	**East Asia & Pacific**	**87.50**
Guyana	**Latin America & Caribbean**	**83.90**
Lao PDR	**East Asia & Pacific**	**82.11**
Solomon Islands	**East Asia & Pacific**	**77.86**

4. RECOMMENDATIONS

Write out a set of recommendations as an analyst on the ForestQuery team.

- *What have you learned from the World Bank data?*
- To aim at afforestation
- *Which countries should we focus on over others?*
  Togo
  Nigeria
  Uganda
  Mauritania
  Honduras

5. APPENDIX: SQL Queries Used

1. **CREATE VIEW**

```
CREATE VIEW forestation AS
(SELECT forest_area.*, (2.59*land_Area.total_area_sq_mi) AS total_area_sq_km,
regions.region, regions.income_group, ROUND(100*CAST((forest_area_sqkm/
(2.59*land_Area.total_area_sq_mi)) AS DECIMAL),2) AS percent
FROM forest_area
JOIN land_Area
ON forest_area.country_code= land_Area.country_code
AND forest_area.year= land_Area.year
JOIN regions
ON forest_area.country_code= regions.country_code)

SELECT * FROM forestation
```

GLOBAL SITUATION

```
SELECT *
FROM forest_area
```

```
WHERE country_name= 'World' AND year= '1990'

SELECT *
FROM forest_area
WHERE country_name= 'World' AND year= '2016'

SELECT (SELECT forest_area_sqkm FROM forest_area WHERE country_name= 'World' AND
year= '1990')- (SELECT forest_area_sqkm FROM forest_area WHERE country_name= 'World'
AND year= '2016')
FROM forest_area
LIMIT 1

SELECT ROUND(100*CAST(((SELECT forest_area_sqkm FROM forest_area WHERE
country_name= 'World' AND year= '1990')- (SELECT forest_area_sqkm FROM forest_area
WHERE country_name= 'World' AND year= '2016'))/(SELECT forest_area_sqkm FROM
forest_area WHERE country_name= 'World' AND year= '1990')AS DECIMAL),2)
FROM forest_area
LIMIT 1

SELECT country_name, (2.59*total_area_sq_mi) AS total_area_sq_km
FROM land_area
WHERE year= '2016'
ORDER BY (2.59*total_area_sq_mi) DESC
```

REGIONAL OUTLOOK

```
SELECT *
FROM forestation
WHERE country_name= 'World' AND year= '2016'

SELECT *
FROM forestation
WHERE country_name= 'World' AND year= '1990'

SELECT region, 100*(SUM(forest_area_sqkm)/SUM(total_area_sq_km)) as percent
FROM forestation
WHERE year= '2016'
GROUP BY region
ORDER BY SUM(forest_area_sqkm)/SUM(total_area_sq_km)


SELECT region, 100*(SUM(forest_area_sqkm)/SUM(total_area_sq_km)) as percent
FROM forestation
WHERE year= '1990'
```

```
GROUP BY region
ORDER BY SUM(forest_area_sqkm)/SUM(total_area_sq_km)

WITH cte as
(SELECT old.region, old.forest_area_sqkm AS old_forest, old.total_area_sq_km AS old_total,
new.forest_area_sqkm AS new_forest, new.total_area_sq_km AS new_total
FROM forestation AS old
JOIN forestation AS new
ON old.country_code= new.country_code
WHERE old.year= '1990' AND new.year= '2016'
SELECT region, 100*(SUM(old_forest)/SUM(old_total)) AS old_percent,
100*(SUM(new_forest)/SUM(new_total)) AS new_percent
FROM cte
GROUP BY region

WITH cte AS
(SELECT old.country_name, old.forest_area_sqkm AS old_forest, old.total_area_sq_km AS
old_total, new.forest_area_sqkm AS new_forest, new.total_area_sq_km AS new_total
FROM forestation AS old
JOIN forestation AS new
ON old.country_code= new.country_code
WHERE old.year= '1990' AND new.year= '2016' )
SELECT country_name, (SUM(old_forest)-SUM(new_forest)) AS chnageinforest
FROM cte
GROUP BY country_name
ORDER BY (SUM(old_forest)-SUM(new_forest)) ASC



WITH cte AS
(SELECT old.country_name, old.forest_area_sqkm AS old_forest, old.total_area_sq_km AS
old_total, new.forest_area_sqkm AS new_forest, new.total_area_sq_km AS new_total
FROM forestation AS old
JOIN forestation AS new
ON old.country_code= new.country_code
WHERE old.year= '1990' AND new.year= '2016' )
SELECT country_name, ((SUM(old_forest)-SUM(new_forest))/(SUM(old_forest)))  AS
chnageinforest
FROM cte
GROUP BY country_name
ORDER BY ((SUM(old_forest)-SUM(new_forest))/(SUM(old_forest))) ASC
```

```
WITH cte AS
(SELECT old.country_name, old.region, old.forest_area_sqkm AS old, new.forest_area_sqkm
AS new
FROM forestation AS old
JOIN forestation AS new
ON old.country_code= new.country_code
WHERE old.year= '1990' AND new.year='2016')
SELECT country_name, region, SUM(old-new) as absolutechange
FROM cte
GROUP BY country_name, region
ORDER BY SUM(old-new) DESC
```

```
WITH cte AS
(SELECT old.country_name, old.region, old.forest_area_sqkm AS old, new.forest_area_sqkm
AS new
FROM forestation AS old
JOIN forestation AS new
ON old.country_code= new.country_code
WHERE old.year= '1990' AND new.year='2016')
SELECT country_name, region, 100*(SUM(new-old)/SUM(old)) as absolutechange
FROM cte
GROUP BY country_name, region
ORDER BY (SUM(new-old)/SUM(old)) ASC
```

```
WITH cte AS
(SELECT country_code, percent,
(CASE WHEN percent <=25 THEN '0%-25%'
    WHEN percent > 25 AND percent <=50 THEN '25%-50%'
    WHEN percent >50 AND percent <=75 THEN '50%-75%'
    ELSE '75%-100%'
    END) as quantile
FROM forestation
WHERE percent IS NOT NULL AND  year= '2016')
SELECT quantile, COUNT(country_code)
FROM cte
GROUP BY quantile
ORDER BY quantile
```

```
WITH cte AS
(SELECT country_name, region, percent,
```

```
(CASE WHEN percent <=25 THEN '0%-25%'
     WHEN percent > 25 AND percent <=50 THEN '25%-50%'
     WHEN percent >50 AND percent <=75 THEN '50%-75%'
     ELSE '75%-100%'
     END) as quantile
FROM forestation
WHERE percent IS NOT NULL AND  year= '2016')
SELECT country_name, region, percent
FROM cte
WHERE quantile= '75%-100%'
ORDER BY percent DESC
```